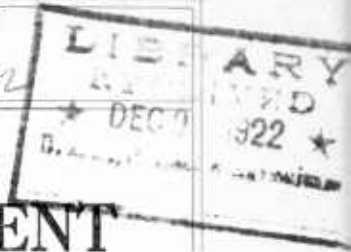


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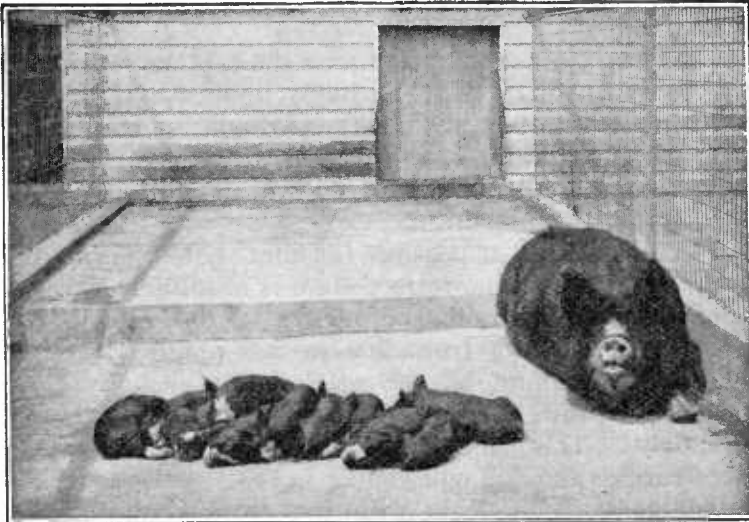
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SWINE MANAGEMENT

GEORGE M. ROMMEL and F. G. ASHBROOK

Animal Husbandry Division, Bureau of Animal Industry



ENJOYING THE SUNSHINE

UNITED STATES
DEPARTMENT OF AGRICULTURE

HOGS are among the most important animals to raise on the farm for meat or for profit, and no farm is complete unless some are kept to aid in the modern method of farming. Swine multiply more rapidly than other farm animals and make greater gains per hundred pounds of concentrated feed consumed.

As a consumer of by-products the hog has no rival.

Hogs might be kept profitably upon a number of farms where they are not found to-day. As a general proposition it is safer for the average farmer to handle a small number of hogs in connection with his other farm business.

As much feed as possible for hogs should be raised on the farm; no more feed than is absolutely necessary should be purchased.

Hogs weighing from 200 to 300 pounds are in greatest demand on the market, and usually the greatest profit is obtained from selling hogs at these weights. The price realized depends upon the kind of carcass the hog will yield.

This bulletin deals with the various phases of swine production, namely: feeding, breeding, and management.

SWINE MANAGEMENT.¹

GEORGE M. ROMMEL and F. G. ASHBROOK, *Animal Husbandry Division,
Bureau of Animal Industry.*

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THE MERITS OF THE HOG.

NO BRANCH of live-stock farming gives better results than the raising of well-bred swine when conducted with a reasonable amount of intelligence. The hog is one of the most important animals to raise on the farm, either for meat or for profit, and no farm is complete unless some hogs are kept to aid in the modern method of farming. The farmers of the South and West, awakening to the merits of the hog, are rapidly increasing their output of pork and their bank accounts. The hog requires less labor, less equipment, less capital, and makes greater gains per hundred pounds of concentrates than any other farm animal, and reproduces himself faster and in greater numbers; and returns the money invested more quickly than any other farm animal except poultry.

In the trucking and mixed-farming sections of the United States hogs are used to consume various unmarketable substances. The value of milk is known on every farm although it may not be fully appreciated, and any one who has fed pigs knows the keen appetite they have for milk and its products. In the neighborhood of many large dairies pork production has become a very prominent and lucrative supplement to the dairy industry. The hog is also a large factor in cheapening the production of beef. Hogs are placed in the cattle feed lots to utilize the corn and other feeds which the cattle have failed to digest and which otherwise would be wasted.

¹ This bulletin is a revision of Farmers' Bulletin 205, entitled "Pig Management," a large amount of the material in that bulletin being used in the present one. The material on equipment and housing, however, has been largely omitted from the present article and will be published in a separate bulletin. The sections on diseases and parasites of swine were prepared with the collaboration of Dr. John R. Mohler, Assistant Chief of the Bureau of Animal Industry, and Dr. B. H. Ransom, Chief of the Zoological Division. In the preparation of the manuscript the authors were assisted by R. E. Gongwer, Scientific Assistant in the Animal Husbandry Division. (Mr. Ashbrook resigned from the bureau February 1, 1921, and Mr. Rommel resigned October 31, 1921.)

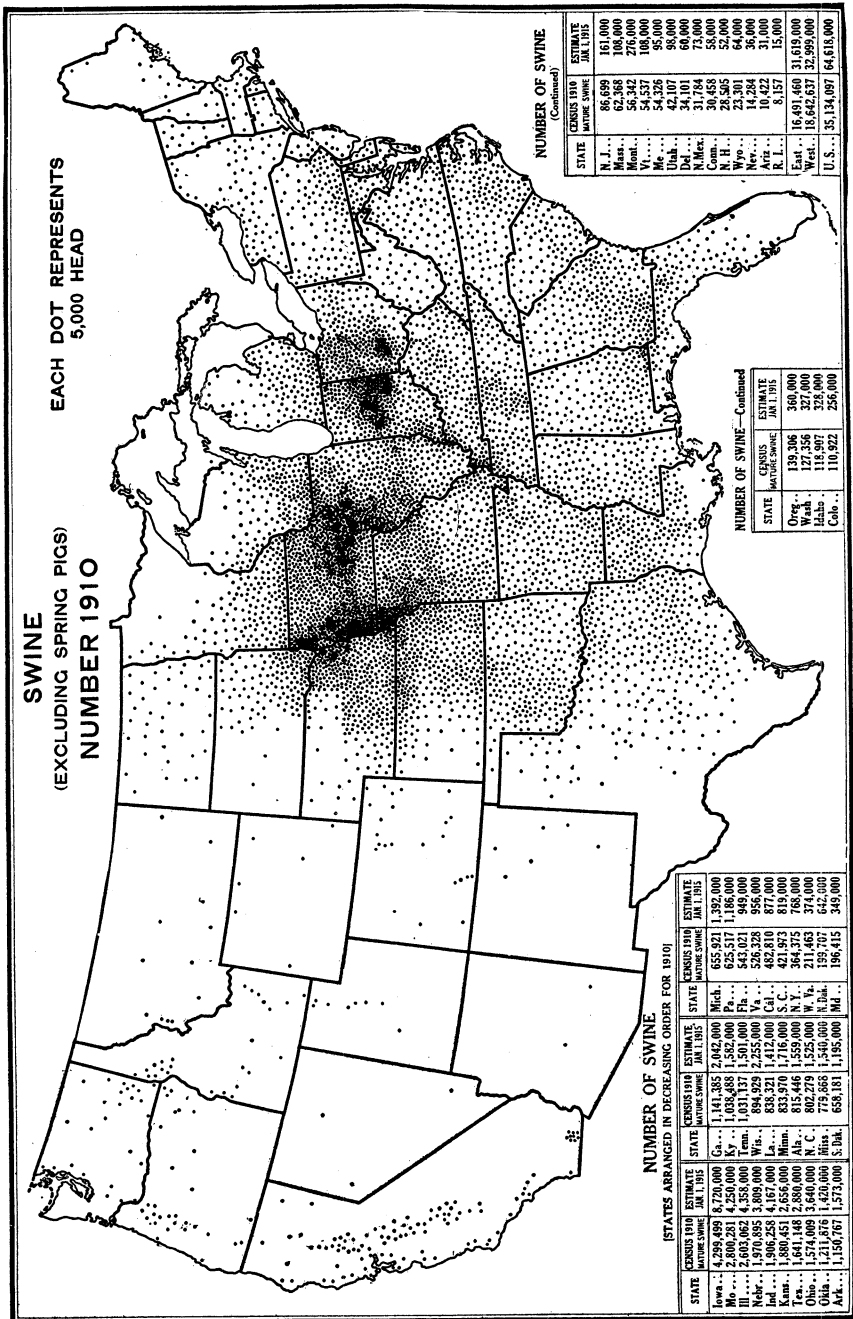


FIG. 1.—Swine in the United States in 1910.

Hogs following steers in many cases have increased the profit per steer by from \$6 to \$9. Farmers and hotel and restaurant owners are using kitchen refuse to produce salable pork. In fact, as a consumer of by-products the hog has no rival.

However, this propensity in many instances is being taken unfair advantage of through ignorance and lack of care. Milk products, animal offal, etc., which contain disease germs, especially those of tuberculosis, are given to hogs. This practice not only results in spreading disease but causes loss in the hogs themselves through condemnation at slaughter. As pointed out in a later section, all such products should be effectively sterilized before being fed.

HOG-GROWING SECTIONS OF THE UNITED STATES.

The first place in hog raising in the United States is easily with the corn-growing sections, where corn is the first grain thought of when the fattening of hogs is considered. It is, however, fallacious to argue that hog raising will not give profitable returns outside of the corn belt. The corn belt has great advantages for economical pork production, but it also has its disadvantages. The cheapness and abundance of corn in this section have often led farmers to use it as the exclusive grain feed. Breeding stock so fed does not thrive well and is not so prolific as when given a varied ration, and when used for fattening, an exclusive corn diet is not generally profitable. The work of the agricultural colleges and experiment stations during recent years has done much to show breeders and feeders the undesirability of this practice, and the increasing price of corn has forced farmers to economize in its use as much as possible.

The few States comprising the corn belt are the source of supply for a great amount of swine products, especially hams and bacon, that are consumed in other portions of the country. Yet the advantages of these corn-belt States are little, if at all, superior to those of many others outside of that district. The South has an abundance of vegetation. Cowpeas, soy beans, velvet beans, and peanuts are leguminous crops peculiar to that section which have great value in pig raising. Corn grows readily in all parts of the South, and in the subtropical sections the experience of feeders with cassava seems to indicate that it has considerable value for pork production. In addition there is generally an abundant water supply; the climate is mild and there is a long period during which green feed is available; thus the expense of shelter and winter feeding is greatly lessened. These conditions, giving a long period of pasture and outdoor life, enhance thrift and with proper management insure great freedom from disease.

The East is peculiarly adapted to hog raising in view of the fact that markets for fresh pork and cured products may be found in

local communities as well as in the larger cities and the various coast resorts. As regards feeds, corn is being grown successfully in the East, and in some sections the average yield per acre is greater than that of the Middle West. Clover, blue grass, and many other forage crops especially adapted for swine production grow rapidly in nearly every section of the East. In the trucking sections there is wasted annually a vast quantity of unmarketable products that might be used with profit in feeding hogs. The dairy districts offer an advantage to the hog raiser by furnishing such by-products as skim milk and buttermilk, which are especially relished and profitably utilized by growing pigs.

In the extreme West the alfalfa of the irrigated valleys and the clover of the coast districts offer a splendid foundation for successful, pork production. In most of these regions there is an abundance of small grain, particularly barley, that may often be fed economically while in some localities corn is a successful crop.

LOCATION OF FARM FOR HOG RAISING.

The selection of a region is not of paramount importance in hog raising in the United States, for swine are successfully and profitably grown in practically all localities and on almost any type of soil; still, if the breeder is free to choose a location the following points should be considered.

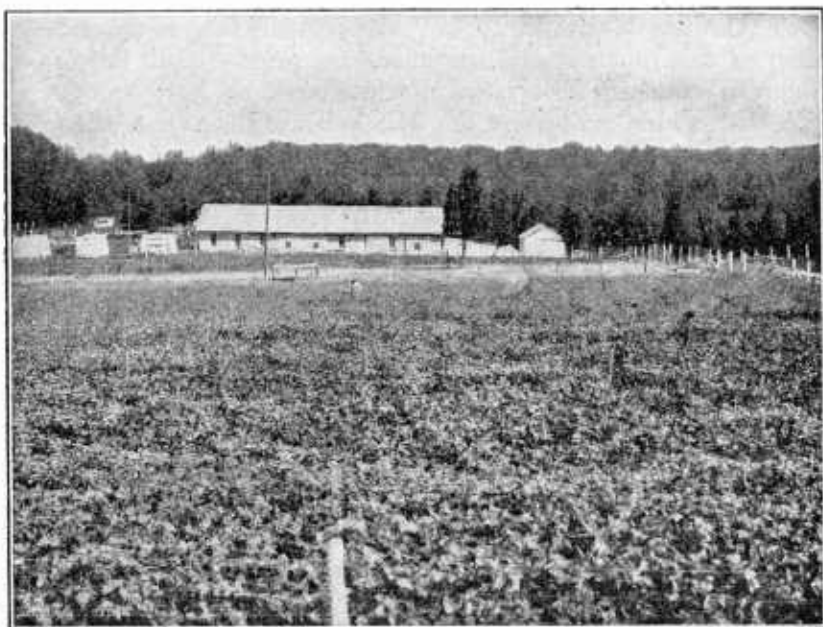


Fig. 2.—Swine harvest successfully and profitably a great variety of farm crops. Forage crops at the Bureau of Animal Industry Experimental Farm at Beltsville, Md., ready to be pastured.

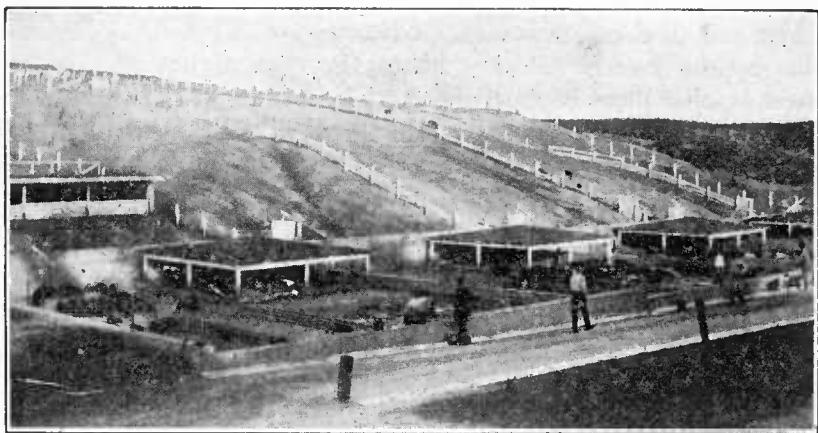


FIG. 3.—Swine can be raised on farms that are somewhat rolling. (Photograph by courtesy of District of Columbia Workhouse Farm, Occoquan, Va.)

An ideal location is on a well-drained farm possessing a rich soil that will produce grasses and other forage as well as the grains needed for fattening the hogs. This does not mean, however, that only those farmers holding rich, level lands should raise hogs, for as a matter of fact hogs are most easily handled on farms that are somewhat rolling. For the production of forage crops the rolling farm is often as good as the level one, and it often has the added advantage of shade and a better water supply. The hill farmer does not have the best situation in all things, but in many instances he has certain advantages which he does not appreciate.

It is an advantage to locate in a hog-raising community. There are many small problems in management which can not be touched upon in a general discussion of hog raising, but they may be learned through actual experience in one's own community. In such cases the older breeders have for a long time been in contact with local conditions, and a new man may profit by their experiences. If a whole community will raise a certain grade or breed of hog, it can obtain a reputation for its product as a community such as an individual never could hope to win. When the buyers learn that a type or breed of hog which they desire is to be obtained in unlimited numbers in a certain locality, they will naturally turn there first to buy the animals. All of which tends to decrease the difficulties of growing and marketing for the small breeder.

The question of a market must always be considered, especially the facilities for reaching it and the type of hog it demands. Most communities have been successfully connected with the large central markets by the railroads, but these will be of little avail if the roads to the stations are poor. Good roads are of inestimable importance,

for, among other things, they enable the farmer to market his products at any and all times, thus taking advantage of any favorable fluctuation in the market prices.¹ As to the type of hog the market demands, that must be determined by local inquiry, but in order to bring the highest market price hogs must be well finished and fat. The greatest demand is for 200 to 300 pound hogs, and farmers generally obtain the most profit by marketing their hogs at weights ranging from 250 to 300 pounds.

NUMBER OF HOGS FOR A FARM.

This question must be determined by a study of local conditions and the type of farming. The maximum number of hogs per acre is found on farms chiefly or wholly devoted to the raising of that class of stock; as, for example, in the State of Iowa, where it is quite common to see farms averaging a number of hogs to the acre, although the average for the entire State is 1 hog to every 3 acres of improved farm land. Under ordinary conditions hogs return the largest profit when raised to utilize waste products, and when kept for this purpose alone the number will depend upon the quantity of waste products to be consumed. Skim milk from dairy herds; shattered grain from grain fields; unmarketable products from the truck farm; undigested grain in the droppings of fattening steers; and many other minor wastes on the average farm are examples of foodstuffs which would be wasted were it not for their utilization by the thrifty farmer for the production of pork. In order to utilize some of these products, it is necessary to have a number of pigs on hand for a relatively short time on account of the perishable nature of these feeds. The rest of the year the fattening pigs and the breeding stock must be maintained upon feed raised expressly for their consumption, and while they are not kept at a loss during this time, still the greatest profit is derived when they are eating their cheap feed in the form of waste products, and the number of hogs which can utilize the waste to the best advantage should be the limiting factor in determining the number of hogs to the farm. On farms in the corn belt where hogs are raised simply to market the corn crop on the hoof, the number is controlled by the amount of corn which can profitably be raised to fatten them.

THE FOUNDATION HERD.

In feeding hogs for the market, as also with any other class of meat animals, larger returns are obtained when the stock is as nearly uniform as possible, and as it is very profitable for each farmer to breed his own feeders, particular attention should be given to the selection of the original breeding stock. Uniformity is of primary importance, for to have a uniform crop of pigs there must be uniformity in the

¹ See Farmers' Bulletin 718, "Cooperative Live Stock Shipping Associations."

breeding herd, and to obtain this must be one of the first considerations in selecting the original herd.

THE SOWS.

The females of the herd may be obtained by purchasing bred sows or gilts safely in pig to a boar of recognized worth. As it is often difficult to obtain a sow which has shown herself to be a good breeder by the previous litters she has produced, it is advisable for economy's sake to purchase bred gilts. These should be about 12 months old, being bred after the age of 8 months, and if possible all should be in pig to the same boar. Here is the first opportunity to practice selec-

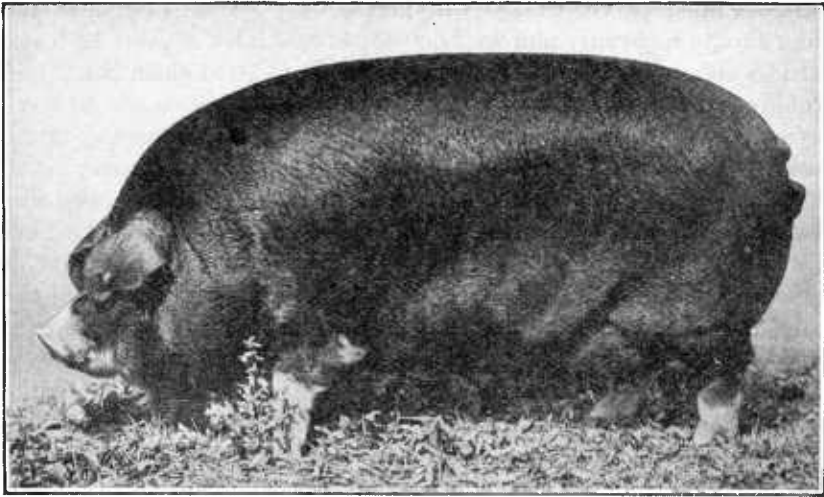


FIG. 4.—A good brood sow.

tion for uniformity; whether pure-bred or not, the sows should be similar in color, marking, type, and conformation. The type of the sows selected should be the one which the market demands. While there is some variation between the different breeds, it is largely a matter of characteristics, as a good individual, no matter what breed it represents, if properly fed and managed will make economical gains.¹

CONFORMATION.

In conformation a brood sow should show first of all femininity. This is well marked in the hog if a close observation is made, and is characterized by quality and refinement in all parts of the body. The bristles are finer and less erect than those of the boar, giving the sow a smoother appearance. The forehead is smoother, the neck much thinner, and a little longer in proportion to the rest of the body.

¹ See Farmers' Bulletin 765, "Breeds of Swine."

The shoulders are not as heavy, although they must not be narrow, for such a condition is an indication of lack of constitution. By no means accept any breeding animal that is narrow-chested, for it is a sure indication of lack of vitality and consequently of breeding ability. Ample capacity in the middle should be provided by well-sprung ribs, and long, deep sides. Many judges of hogs regard good roomy sows as being especially high in fecundity, and this characteristic is certainly no detriment to their conformation, provided it is combined with quality.

A sow should show the type demanded in a market animal, namely, a strong, wide, deeply-fleshed back; smoothly covered shoulders; plump, well-rounded hams; and a trim, neat underline. A wide, well-developed pelvic cavity will insure easy parturition, and the udder should be evenly and well developed and have at least 12 teats. Her legs should be strong and well placed, have good clean bone, and strong, straight pasterns. It is not of as great importance to have perfect feet and legs in a sow as in a male, but she should show no weakness at this point. A sow should have scale and size, combined with quality. Strong, clean, hard bone, trim joints, neat ears, fine glossy bristles, and freedom from folds and wrinkles in the skin, are all indications of quality. A large, raw-boned sow, having plenty of capacity and size, but lacking in femininity and quality, is one of the poorest investments a breeder can make, for her pigs will be slow to develop, hard to fatten, and lacking both in numbers and in uniformity. Quality combined with femininity and scale in a sow of the accepted market type will, as a rule, insure a profitable breeding animal, and a lack of any one of these factors is apt to result in failure.

SELECTION.

If possible, the first purchase of sows should be made from one herd, for in this manner it is easier to get uniformity. Uniformity goes deeper than the mere visible type or conformation; it is determined by past ancestry and is controlled by the characteristics contained in the germplasm. The germplasm is continuous, extending from individual to individual, and any member of the chain shows in its visible conformation only a few of the possible combinations. In other words, a sow may not produce offspring similar in type to herself, unless her ancestors were of the same type. By selecting the sows from one herd, it is not only possible to choose animals similar in visible type, but they are apt to be similar in dormant characteristics as well. In buying such animals the farmer is not purchasing separate individuals to form so many breeding units, but rather kindred individuals, all parts of a single established line or type which will blend together to form a single breeding unit.

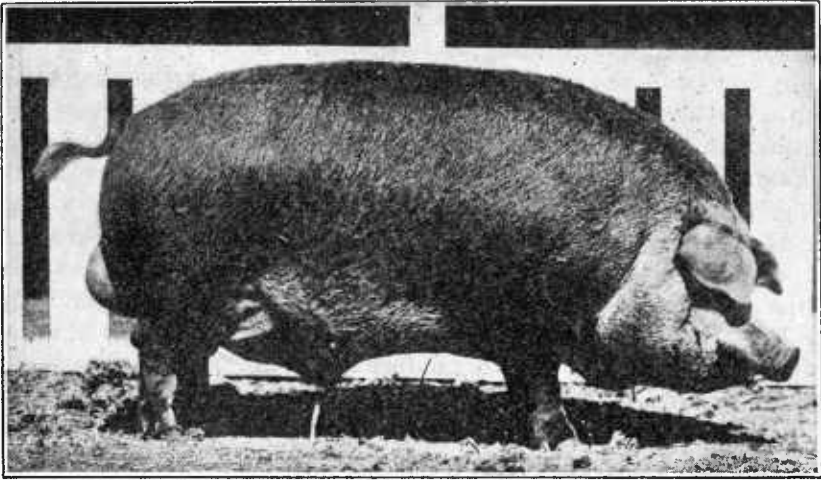


FIG. 5.—A boar of good type.

At best, it is impossible to choose sows that will produce true to type, for as yet no line of breeding is absolutely pure, but by selecting the sows in this manner the chances for uniformity are immeasurably increased. Some mistakes are bound to be made and their correction will be difficult, but by keeping records of the breeding stock and their produce, it will be possible to dispose of undesirable individuals as their poor reproductive ability becomes known. One ideal must always be uppermost in the breeder's mind, and the stock must constantly approach nearer to that one ideal in order to make any real progress. It is relatively easy to produce hogs, but to produce uniform hogs, hogs that will build up and advance the breed, requires time and constant effort.

THE BOAR.

The farmer who lives in a community where it is possible to obtain the services of a good boar, and who has only a few sows, will not find it profitable to keep a male simply for use in his own herd. However, if he has six or more sows, or if it is impossible to get the use of his neighbor's boar when necessary, it will be well to purchase one of his own. It is often desirable to delay the purchase of the boar until some time after the original female stock has been selected. If the gilts were bred at the time of their purchase, the service of a boar will not be needed until several months later, when it is necessary to breed for the second lot of pigs. This is not only a saving of money at the time of starting the herd, when expenses are apt to be very heavy, but it also gives the breeder time to study the original sows along with their offspring and select a boar that will correct their faults.

There is a hackneyed but nevertheless true expression that the "male is half the herd." He really does represent 50 per cent of the

breeding stock, and therefore is the most important individual in the whole herd, but granting that he forms half, the sows most certainly constitute the other half, even though their influence is divided into several parts. Certainly both halves are equally important and neither can well be neglected at the expense of the other.

Every pig in the herd is sired by the male, while any one sow can influence only a relatively small number of them. For this reason the boar should be as excellent an individual with as high breeding as possible; certainly a better representative of the breed than any of the sows, for only by such a process will it be possible to grade up the herd. The succeeding generation must always be kept in mind and be provided for, and to produce a gilt for breeding purposes which is not of a better type, nearer the breeder's ideal than her dam, is to be taking a step backwards, not forward. This can only be obtained by having a boar more perfect in type than the sows, which holds true whether the herd is a grade or a pure-bred one.

It is well to select a boar at least 8 months old, for the selection of a weanling pig that will mature into the kind of breeding animal demanded in any particular case is a very difficult and precarious undertaking. In selecting the male, aim to correct any faults which may be present in the conformation of the sows. These faults may be discovered in the several months between the first purchase of the bred gilts and the time when it is necessary to breed again for the second litter. It is seen here why uniformity is of such importance in the herd, for the common fault of the sows may be corrected in the offspring by the use of a boar particularly strong in that characteristic; but if the sows are not uniform—if, for example, one has high quality with lack of scale, while another has the opposite characters—it will be impossible to select one boar that can correct the faults of both.

The boar must show masculinity first of all. This is characterized by a strong head, a thick well-crested neck, well-developed shoulders, stiff bristles, and a little coarser hair than is found in a sow of the same weight and age. His visible reproductive organs should be well developed. By no means select a boar having only one testicle, or one having two small, ill-defined ones. Constitution should be strongly in evidence, for this indicates the vitality necessary to get strong, healthy pigs. The market type indicated for the sows should be found in the boar, namely, a long, strong, well-arched back, thickly covered with flesh—not fat; a well-rounded, plump ham; a deep, smooth side; and a trim underline. He must have quality, but with it strength of bone and scale. A small, over-refined boar is often lacking in masculinity. Strength of bone is shown in the development of the feet and legs, and the manner in which the animal carries himself upon his toes. As the hind pasterns are very prone to become weak with age and may interfere seriously with service-

ability, select a young boar, one that stands well up on his toes. This characteristic is found only in one having excellent strength and quality of bone.

FEEDING AND MANAGEMENT.

The same good judgment required in the selection of stock is very necessary in the feeding and management. Good selection will be rendered ineffective if the feeding and management are not such that the animals will thrive and yield a good increase. The real problem in swine feeding is to supply sufficient nutritive material for building and repairing the body and furnishing sufficient energy to lay on fat. The most satisfactory ration must necessarily be made up of feeds which are wholesome, relished by the hog, and at the same time reasonable in cost.

It has been asserted by various experienced feeders of hogs that a mixture of charcoal, ashes, lime, salt, sulphur, and copperas kept where the hogs can eat it will tend to prevent worm infestation. There is no positive experimental evidence, however, in support of the idea that such a mixture will prevent worm infestation, and it is of value therefore as a source of mineral matter in the diet, and per-

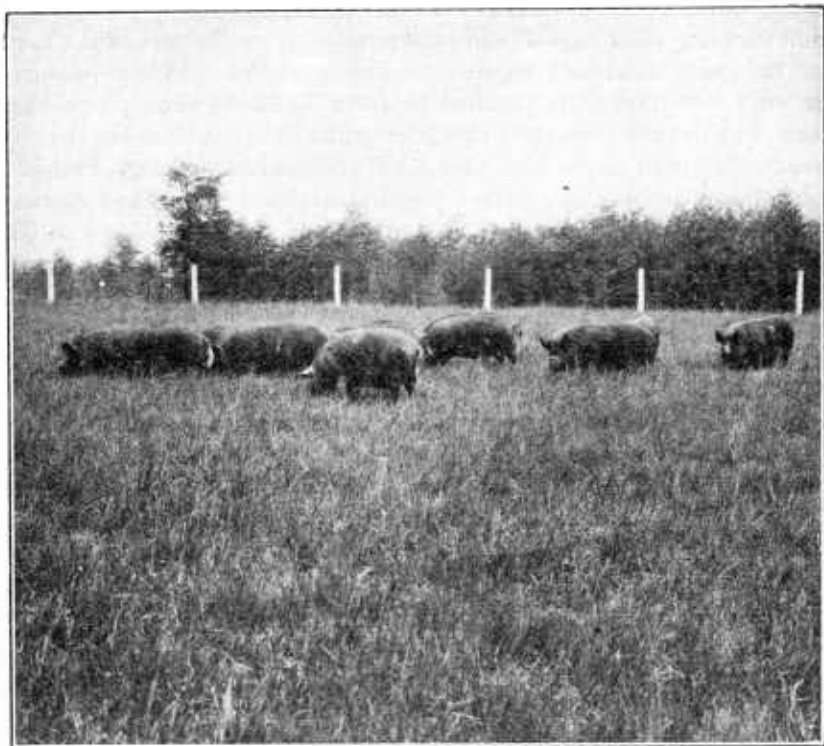


FIG. 6.—Brood sows on permanent pasture.

haps as an appetizer and tonic, rather than as a worm preventive. A balanced ration may furnish all the necessary feed nutrients, yet the system of the hog craves mineral matter. The mineral matter is not under control, and in order to make sure that the hogs have an abundant supply, free access should be given to a mineral mixture. The following is a formula for such a mixture:

Charcoal mixture.

Charcoal.....	1 bushel
Hardwood ashes.....	1 bushel
Salt.....	8 pounds
Air-slaked lime.....	4 pounds
Sulphur.....	4 pounds
Pulverized copperas.....	2 pounds

Mix the lime, salt, and sulphur thoroughly and then mix with the charcoal and ashes. Dissolve the copperas in 1 quart of hot water and sprinkle the solution over the whole mass, mixing it thoroughly. Keep some of this mixture in a box before the hogs at all times, or place in a self-feeder.

THE SOWS.

Dry sows can be placed in pasture by themselves and given very little grain. Those which show an exceptionally run-down condition from suckling their pigs should be separated from the rest of the herd and fed grain until they regain breeding condition. Where pastures are very luxuriant it is possible to carry breeding sows on pasture alone, but in such case their condition must be studied closely by the breeder, in order to be sure that they are receiving enough nourishment from the pasture. Hogs require attention regardless of condition, age, or sex, but the management of the brood sows is the surest test of the breeder's skill.

AGE OF BREEDING.

The age at which a young sow is first bred will depend upon her development, but it is seldom advisable to breed her before she is 8 months old. A very young sow seldom produces a large litter. Another objection to early breeding is that a young sow has not the strength to stand the strain of nursing a litter of pigs, and her growth may be checked to such a degree that she never fully develops.

A sow farrows 112 to 115 days from the date of conception. By keeping a careful service record, the breeder is therefore able to determine accurately when to expect the pigs and to make his arrangements accordingly. For convenient reference the gestation table on the next page was arranged by Coburn¹ to show the expected farrowing dates for service on any day of the year from January 1 to December 31. Calculations are based on a 112-day gestation period.

¹ F. D. Coburn, "Swine Husbandry," p. 121.

The first line of dates in each column indicates the dates of breeding and directly opposite in the same column is the date on which the sow is due to farrow.

It is common practice among farmers to require their sows to produce two litters a year. Although the sows have had good care, they will naturally be run down somewhat in condition, because the greater portion of the feed consumed has been utilized for the production of milk.

The sow needs a rest before she is bred again, and the time for this is between the weaning and breeding periods. Intelligent feeding will bring the sow from a thin condition into a good, strong, vigorous condition in a short time. When this is done she will be in proper condition to assume her duty when breeding time arrives. If the sow is bred in a thin, run-down condition, she must resume work immediately, and she will naturally be weak and subject to the inroads of disease. A little cold contracted in this condition may cause death, while a strong, healthy sow will resist such attacks. It is the general belief that sows in good vigorous breeding condition conceive more readily, thus shortening the farrowing period for the herd. Alfalfa,

Calendar showing dates of breeding and farrowing for sows, based on 112-day gestation period.

March.....	1. 22	2. 23	3. 24	4. 25	5. 26	6. 27	7. 28	8. 29	9. 30	May	June	July.....	April.....	May.....	August.....	September.	June.....	July.....	October.....	November.	August.....	September.	December.	January.....	October.....	November.	February...	December..																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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rape, clover, or any pasture which is palatable to swine, with some grain in addition, is excellent feed for bringing the sow back to breeding condition.

TWO LITTERS A YEAR.

There is no good reason why a sow should not produce two litters a year when properly handled. To accomplish this the sow should be bred to farrow, say, for example, in March, and bred again to farrow the early part of September. A sow bred about November 15 will farrow about March 6 to 9. The pigs should nurse 8 weeks. The sow should be rebred by May 20 so as to farrow on or after September 8. The pigs could then nurse until November 3. The chances for profitably rearing two crops of pigs from a sow annually are undoubtedly far better in regions of mild climate and short winters than where the winters are long and severe.

MANAGEMENT DURING PREGNANCY.

During pregnancy two facts must be borne in mind. The first is that the sow is doing double duty. Not only is she keeping up her own bodily functions, but the development of the litter is an increasing drain on her system. Feeding at this time should be liberal, although it need not be so heavy as after the pigs are farrowed. A very fat sow is apt to be clumsy with her pigs, and sometimes these are lacking in vitality. On the other hand a very thin sow will either not do justice to her pigs or will become a mere wreck herself during the time she is nursing her litter, and the chances are that both these things will happen. The necessity of exercise must not be overlooked under any circumstances. This may be provided by a large lot or even by driving the hogs slowly for a short distance each day.

In the second place, the main demands upon the sow are those for the building of new tissue. Therefore, the kind of feed is important. The nitrogenous or protein-bearing feeds are needed at this time, such as tankage, bran, oil meal, peas, beans, oats, and barley. The clovers, alfalfa, peas, beans, vetches, etc., are also of much value to the brood sows. Special emphasis should be laid on the condition of the bowels during pregnancy and particularly at farrowing, the special danger to be avoided being constipation. The grain ration should be given as slop, and toward the close of gestation oil meal or a small amount of flaxseed meal should be introduced into the ration.

Corn should not be fed in large amounts to breeding stock, because it does not furnish enough bone and muscle-forming constituents to properly develop the unborn pigs.

During the winter more care will be needed to keep the sow in good condition on account of the absence of pasture. Not only does

the hog's system crave green feed, but more or less bulk is demanded. To offset the lack of green feed nothing surpasses roots. These may be sliced or pulped and mixed with the grain, or may be given whole as a noon feed. However, care must be used in feeding roots, as they are laxative in effect and if fed in excessive amounts may bring about profuse action of the bowels.

Some eastern farmers recommend the use of clover or alfalfa hay, sheaf oats, or corn fodder to supply the bulky requirement of the ration. Charcoal, ashes, lime, and salt should be accessible

at all times. During the entire period care should be taken to keep the system well toned. The sow should become accustomed to being handled and should look upon her attendant as a friend.

The brood sows may run together up to within two weeks of farrowing time; then it is well to separate them, placing each sow by herself in a yard with a small house, which should be dry, airy, and clean. A great deal of exercise will not now be necessary. The feed should be reduced somewhat, and if there is any tendency to constipation, a slight change of feed may be necessary.

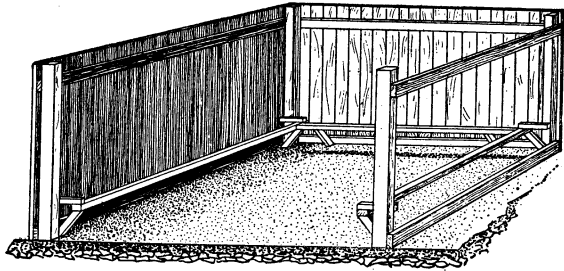


FIG. 7.—Farrowing pen with fenders.

FARROWING.

As the time for farrowing approaches the sow should be watched carefully, in order that assistance may be given if necessary. The feed at this time should be sloppy and limited in amount. The sow generally becomes nervous and restless as parturition approaches; she makes a nest for her young; a swollen vagina and milk down in the teats are other visible signs. It is practically certain that a sow will farrow late in the afternoon or the following night when milk is found in the teats in the morning.

Nothing but lukewarm water should be given the sow during 24 hours previous to farrowing. If she has already farrowed a litter and has been properly fed and cared for during pregnancy, little difficulty may be expected; but with young sows, particularly those bred at an immature age, there is considerable risk at this time, not only to the pigs but to the sow herself.

There is a difference of opinion as to the amount of bedding which should be given to the sow at this time. An active sow in compara-

tively thin condition can be trusted with a liberal amount of bedding, but sows which are in high condition or which are at all clumsy, had better be given only a moderate amount of bedding. Leaves or short straw are preferred.

The farrowing pen should be dry and well ventilated, but free from drafts. Provide the pen with a guardrail made of 2 by 4 inch pieces set 2 inches from the sides of the pen about 10 inches above the bed. These prevent the sow from lying against the partition and lessen the danger of injury to the pigs. The little fellows will soon learn to creep under the guardrail when the sow lies down.

The management of the sow during farrowing depends largely on the animal and on the weather conditions. Assistance should be at hand if needed, but the sow need not be helped if she is getting along nicely.

What to do when the pigs arrive.—When the pigs are born during warm weather they will generally find their way to the teats unaided. In extremely cold weather the pigs will be in danger of being chilled unless the hog house is heated. To remedy this place a few heated bricks in the bottom of a basket or small box, cover with chaff or straw, and put a cloth over the top to keep in the heat; unless the sow objects too seriously the pigs may be rubbed dry with a soft cloth and placed in the receptacle as fast as they arrive. If any of the little pigs appear to be lifeless when they are born, first see that all mucus is removed from the nose, then give the pig a few gentle slaps on the side with the hand. This will start breathing if there is any life in the body. Give it a suck of the sow's milk and place it in the receptacle, as described previously. The pigs will not suffer if they do not suck for a few minutes after farrowing.

Cut out the black teeth.—Before placing the pigs with the sow cut out the eight small tusk-like teeth. There are four of these on each jaw in the rear of the mouth. These teeth are very sharp, and if left in they will likely cause tearing of the sow's udder, and the little pigs will cut one another's mouths while fighting for a teat. These teeth can be removed with bone forceps, wire nippers, or with a knife. Never pull out the teeth; always cut or break them off. After this is done place the pigs with the sow, care being taken that each one gets a teat. When the afterbirth is passed it should be removed from the pen at once and buried or burned. There is good reason to believe that eating the afterbirth is often the beginning of the habit of eating pigs.

THE SOW'S FEED.

As a rule the sow should have no feed the first 24 hours after farrowing, but should be given a liberal drink of warm water. If, however, she shows signs of hunger a thin slop of bran and mid-

dlings may be given. The feeding for the first 3 or 4 days should be light and the time consumed in getting the sow on full feed should be from a week to 10 days, depending on the size and thrift of the litter.

Great care must be taken to feed the sow properly. If she is not properly fed the little pigs will show it. If the pigs follow the sow around very much and pull at her teats it is a good sign that she is not giving enough milk, and more feed should be given to stimulate the milk flow. On the other hand, when a sow is overfed, causing a heavy flow of milk, scouring is generally produced in the pigs. If this happens cut down the sow's feed immediately and give her 15 to 20 grains of sulphate of iron (copperas) in her slop morning and evening; if necessary, increase the dose until results have been obtained.

EXERCISE IS NECESSARY.

After the sow has farrowed it is best for her to be in the open air. Of course, if the pigs were farrowed in the winter time care will be needed, and it may be necessary to let the pigs reach the age of two weeks before turning them out. They can, however, get considerable exercise in the piggery or in the lot with the sow, and there is often a lot adjoining a barn that is sunny and sheltered from the cold winds, where the sow and pigs may be turned for exercise. Do not allow the pigs to run out during a cold rain.

If the pigs do not get exercise, they will become fat and lazy and the usual result is the "thumps." This is caused by the fat getting so thick around the heart and lungs that the pigs find it difficult to breathe. The best way to prevent this is to avoid overfeeding and make the young pigs take plenty of exercise.

DRYING UP THE SOW.

When the sow and pigs are separated, the sow's feed should be cut down to check the secretion of milk. A good plan to follow is to

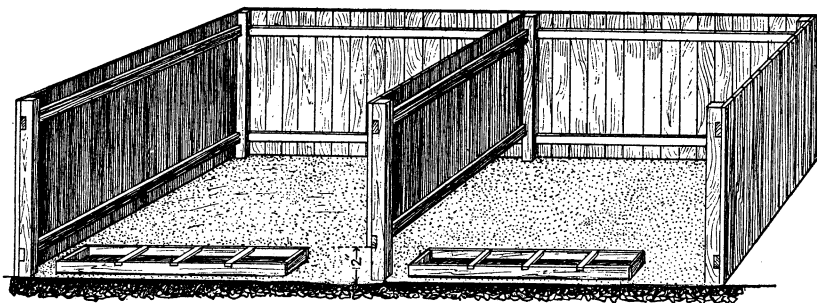


Fig. 8.—Double pen for feeding sucking pigs; partition raised to permit pigs to run to their feed without interference from the sow.

keep the sow in a pen and feed her nothing but dry oats, with plenty of clean water to drink. In a few days she will be ready to turn out on pasture or into a feed lot with the other sows. In case the sow's udder gets very full of milk, do not turn the pigs in with the sow, but instead milk the udder dry by hand. The sow's udder sometimes becomes hard and inflamed. If this happens bathe the udder with hot water and apply equal parts of lard and turpentine.

SOWS EATING THEIR PIGS.

A sow's desire to eat her pigs may result from a number of causes, although it is not natural for a sow to destroy her young. When the sow is constipated she becomes feverish, develops an abnormal craving of appetite, and may kill her pigs and eat them. To prevent this condition the sow should be properly fed during pregnancy. Oil meal in the ration will aid in keeping the bowels regulated. In extreme cases of constipation salts should be used. The afterbirth should be promptly removed from the pen and burned or buried. If left in the pen the sow is likely to devour it, and as the scent of the newly-born pigs is similar, some of them may also be eaten. A sow that has acquired the habit of eating her pigs should be watched carefully to see that her bowels are working properly. When she farrows rub each pig with a cloth saturated with kerosene, so that they will have the smell of the oil. Great care should be taken not to put too much kerosene on the pigs, as it will blister the skin. When the sow's nose detects the odor of kerosene she will decide not to eat the pigs.

THE BOAR.

The management of the boar is a very important part in the raising of strong, healthy pigs, and one which is sometimes neglected. He should be the most valuable animal in the whole herd, and as such deserves the best of attention. The boar should be purchased from a breeder of pure-bred hogs when between 8 months and 1 year of age. Many breeders, however, purchase a boar when a weanling pig, but to be successful in this choice requires a wide experience and sound judgment. Aged boars which have proved their worth can sometimes be purchased at a reasonable price. It is much safer for an inexperienced breeder to buy an old, active boar than a young untried boar. If possible, the farmer should visit the herd where the boar was raised and note the conditions under which he was bred. At any rate, it is always possible to obtain from the breeder notes on the health and the kind and amount of feeds used, so as to serve as an index to his subsequent treatment.

Upon arriving at the farm the boar should be unloaded as soon as possible and placed in quarantine to guard against the introduction of disease into the herd. If he is lousy it is well to treat this condition

at once. His feed should be a continuation of that to which he has been accustomed, feeding rather lightly the first few days until he recovers from the strain of shipping and becomes accustomed to his new surroundings. If it is not feasible to continue feeding as previously indicated, the change to a more convenient ration should be made very gradually in order not to disturb the appetite or health of the animal. As a rule, a pig 8 to 12 months old will be in proper breeding condition when received unless he has been very heavily overfed. In purchasing an older boar, particularly one which has been in the show circuit, it is often necessary to reduce his condition before attempting to breed. With some animals the breeding power is permanently impaired by too high condition at some time in their life. The boar should be well fed but not fat, as a too high condition makes him inactive, a slow breeder, and a rather uncertain sire.

MANAGEMENT DURING BREEDING SEASON.

During the breeding season it is well to confine the boar to his paddock, seeing, however, that he has plenty of exercise. As the sows come into heat they may be brought to the boar's pen for service. This is a much better plan than permitting the boar to run with the herd, because by this method an accurate record can be kept to indicate when the sow will farrow, or if she did not breed, when she may be expected to be in heat a second time. It also permits of one boar serving more sows in a season, for the sow can be removed from the paddock as soon as bred. By following this practice as many as 50 or 60 sows may be bred to one mature boar in one season, which is a much larger number than could be bred by any other method. The lapse of time between heat periods is 21 days in the case of the sow. A breeding crate should be in the paddock and put into use whenever there is much discrepancy in the size of the sow and boar. Many breeders use the breeding crate for every service; it really saves time and is an insurance against injury to the sow.

The boar's ration during this season should be a relatively narrow¹ one of abundant quantity. The only index to the amount of feed is his condition, and this should be evenly maintained if possible throughout the entire breeding season, increasing or decreasing the quantity of feed as his condition becomes too thin or too fat. In order to keep him in health some laxative feed, such as wheat bran, should constitute part of the ration, and if corn is fed it should be combined with some protein concentrate, such as tankage or linseed-oil meal.

¹ A narrow ration is one which contains a relatively high percentage of crude protein furnished by such feeds as tankage, oil meal, fish meal, skim milk, etc. A wide ration is one rich in carbohydrates and rather limited in crude protein. Examples of carbohydrate feeds are corn, barley, sorghum, etc. Narrow rations are conducive to rapid growth and are generally fed to growing animals. Wide rations are fed to fattening animals to produce large and rapid gains.

CARE WHEN NOT IN SERVICE.

The rest of the year the boar should not be fed so heavily, and should have a wider ration, that is, one containing less of the protein concentrates and relatively more corn. The ration at this time is practically the same as that fed the brood sow when she is not producing a litter of pigs. He should have the run of a pasture a quarter of an acre in area in connection with his paddock. Here he can exercise and obtain much of his feed from the forage, or in the winter when the forage is consumed he may be fed on alfalfa or clover hay in connection with the grain ration. Keep the boar healthy, give him exercise, plenty of rough feeds, and keep him in condition by varying his supply of grain. Under such conditions little trouble will be experienced in getting a normal boar to produce large litters of strong, healthy pigs.

THE PIGS.

It is of the greatest importance in producing pigs for the market that they gain in weight as rapidly as possible. The modern hog is a highly specialized and efficient machine for the conversion of grain and roughage into edible meat; but to obtain the greatest efficiency, to make the most pork from a given amount of feed, to make the best pork, and to make that pork most economically the machine must be kept running to capacity from birth to the time of marketing. Nothing is more important than this factor. The question of breeding, the kind of feeds fed, and the proportion of the protein to the fattening elements in the ration are all important and are all means to the same end, but if the greatest profit is to be returned to the feeder his pigs must make maximum gains at all times.

SUPPLEMENTS TO SOW'S MILK.

The first opportunity to force the pigs comes when they are a few weeks old. Up to this time they have been living solely on their dam's milk; in fact there is no successful substitute, as has been demonstrated by repeated failures to raise newly-born pigs on cow's milk. The milk of the sow is much richer in protein, fat, and ash than is cow's milk, and the latter makes such a poor substitute that pigs under two weeks of age usually die of digestive troubles following its exclusive use. After growing for three weeks the young pigs begin to have an appetite for some feed to supplement the sow's milk, and they should be fed, for unless they are the strain on the sow will be a very serious one. The pigs will eat from the sow's trough, especially if she is being fed on thin, sloppy feeds. A pen should be arranged adjoining that of the dam and separated from it by a partition with sufficient room at the bottom to allow the pigs to run under. In the inclosure to be used by the little pigs place a low shallow trough to contain their skim milk or mash.

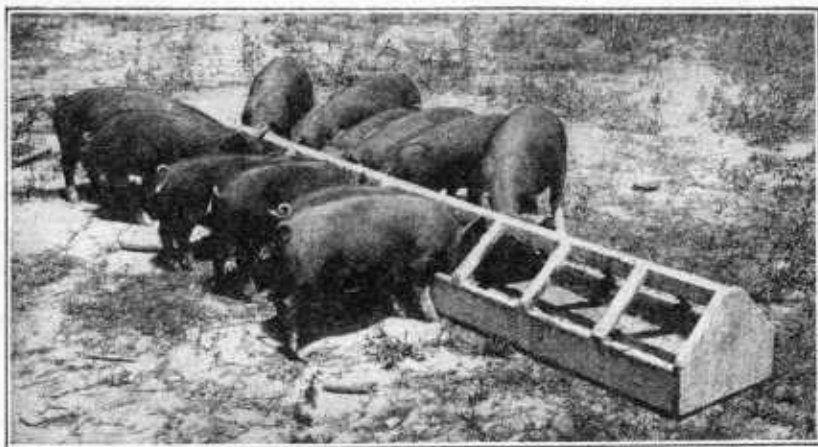


FIG. 9.—A cheap and convenient weaning trough.

The best feeds for pigs of this age are dairy by-products, such as skim milk or buttermilk. These, mixed with mill feeds, as middlings, shorts, and even a cheap grade of flour, or with a meal of ground oats from which the hulls have been removed, give excellent satisfaction. Some feeders use the self-feeder at this time, placing it inside a creep that will admit the pigs to their grain at all times. This is best adapted for pigs after 6 weeks old, where there is a lack of skim milk and they must be prepared for the period following weaning without this feed.

CASTRATION.

Pigs should be castrated while they are young; the best time is between 6 and 8 weeks of age, before weaning. At this age there is less shock to the pig and possibly less check in growth. If it is still suckling its dam, the chances are that it will be more thrifty and in better condition than when the operation is performed immediately after weaning. A pig 6, 7, or 8 weeks old is small enough to be handled conveniently, and the testicles are large enough to render the operation quite simple. For detailed information on this subject consult Farmers' Bulletin 780, "Castration of Young Pigs."

WEANING.

Breeders differ widely as to the age for weaning. The majority wean at 6 to 10 weeks, with a considerable number at 12 weeks; some wean later than 12 weeks and a few earlier than 6 weeks. There should be no hurry about it; 8 weeks is young enough if skim milk is available. Of course, the size and development of the pigs have a great deal to do with the weaning age. If skim milk is not obtainable, it is better to let them nurse the sow until 10 weeks old. The

weaning should be brought about directly and in all cases be complete and decisive. The pigs should be placed apart from the sows in quarters secure enough to prevent communication. If the sow is still milking considerably, it is best to milk her dry by hand rather than to return the pigs to her. The pigs will be no better off and the sow infinitely worse than if weaning is brought about decisively.

THE WEANING RATION.

Skim milk and corn or skim milk and shorts, fed in the proportion of 3 to 1, make an excellent ration for weanlings. If skim milk is not available, a mixture of 5 parts corn meal, 4 parts middlings, and 1 part tankage fed as thin slop is very good. Good, succulent pasture is always in order. It will aid wonderfully in putting growth on the young pigs, and the grain expense will be lessened. After the pigs have been weaned and are eating well the most difficult part of their care is over. The feeding and management from then on will depend much upon whether they are to be kept for breeding or fattened for the market.

SELECTING PIGS FOR BREEDING STOCK.

Soon after weaning it is best to separate those animals which are to be kept for breeding purposes from the fattening stock. Only

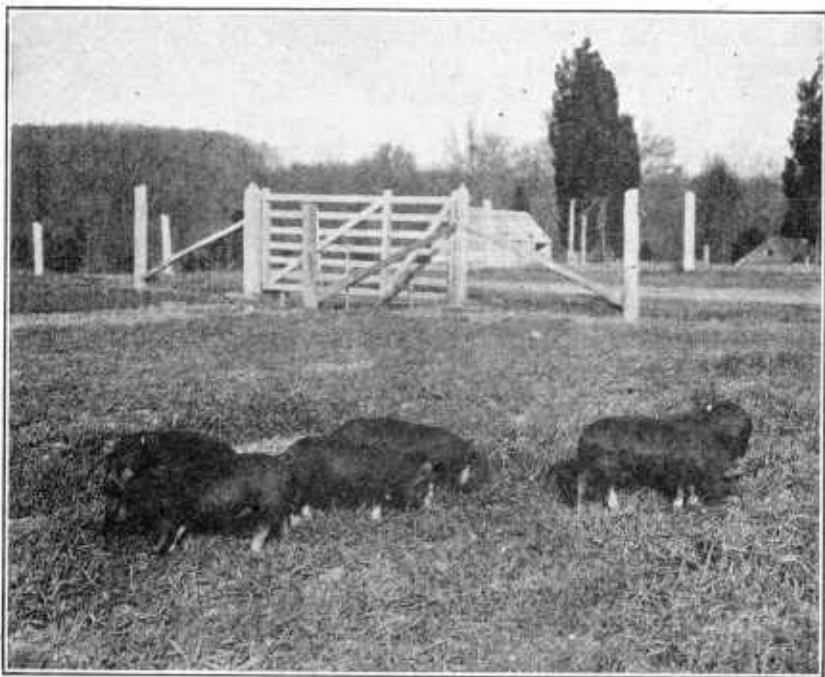


FIG. 10.—Good, succulent pasture is excellent for pigs after weaning.

such gilts as show exceptional type and conformation should be chosen to replace or augment the sows in the herd. No male animals should be saved entire unless the breeder is growing pure-bred registered swine. When they are so saved, their care and feeding is similar to that of the gilts.

The breeding stock must not be pampered. This does not mean to neglect them, but it is not best to house them as carefully or feed them as heavily as the fattening stock. Sows should be trained to resist the weather and to utilize forage crops, that they may have vitality and the ability to eat cheap feeds. Pasture should be furnished in abundance to these young gilts, particularly such crops as the legumes. It is best to feed some grain to the breeding stock to keep them growing nicely, but they must never be pushed, for the whole object in their feeding is to make them stretch out and develop bone and muscle in place of fat. A grain ration containing more protein than is fed to fattening stock is very good for breeding animals, an ideal ration being similar to the ones previously given as weaning rations. Two pounds for each 100 pounds live weight is about the right amount to feed. The gilts are kept on the same feed until time to breed for the first litter, after which they are maintained in much the same fashion as the old sows during pregnancy, except that they are fed a heavier ration. The gilt at this time must not only grow the unborn litter, but must be furnished nutriment to continue her own growth.

THE FATTENING STOCK.

After weaning, the stock selected for fattening is fed in two periods—first, the growing period, from weaning until approximately 6 weeks to 2 months of the marketing date; and, second, the finishing period, from that time up to marketing. During the first or growing period the ration is much the same as that given to the breeding stock—that is, all of the nutritious pasture they need but with a heavier grain ration of slightly wider¹ nutritive ratio. The object is to grow a pig with plenty of size and scale and one that will fatten quickly and economically. Some feeders use the self-feeder at this period and obtain excellent results, giving the pigs free access to such feeds as corn, mill feeds, and tankage while on pasture. The practice tends to shorten the feeding period and produces pork with slightly less grain per unit of gain. Under these conditions pigs do not neglect their forage but really make more economical use of it than when the grain is limited. In feeding a limited grain ration on pasture more success has been attained by giving an amount equal to 3 per cent of the body weight than when fed in lesser amounts.

¹ See footnote on p. 21.

The most rapid but also the most expensive gains in the pig's life come during the finishing period. During these last few weeks before slaughter the animal is given all the feed he will consume with relish. Much more corn and less protein concentrates are fed during this period, a representative ration being composed of 10 pounds of corn to 1 pound of tankage. The change in rations must be gradual and the increase in feed not too rapid; otherwise the animal is apt to "go off feed," or lose his appetite. Pastures are very valuable at this time, especially those composed of feeds high in protein, for they furnish a cheap source of nitrogen and keep the pig toned up and his appetite keen. A hog will consume a $3\frac{1}{2}$ to 4 per cent grain ration at this time, depending, of course, on the character of the feeds and the weight of the hog, a larger hog eating less in proportion to his weight than a smaller one. The self-feeder was primarily devised to finish the hog at this time and serves its purpose in excellent fashion. Slightly more rapid and economical gains are made by its use than can be obtained by the best of hand feeding.

WEIGHTS OF PIGS AT GIVEN AGES.

A trade paper has published statistics based on information obtained from practical breeders concerning the weights of pigs at various ages. The 12 breeders reporting were asked to state the weights of their own pigs at given ages, and at the same time name the weights which they considered pigs ought to weigh at these ages; the purpose being to establish a weight standard for swine raisers to work up to. The averages of these figures are given in the table below, also the average weights of 121 pigs bred and fattened at the Bureau of Animal Industry Experimental Farm at Beltsville, Md. The latter weights are shown more in detail in figure 11, and it will be observed that they terminate at 8 months, when the animals were marketed.

Comparison of pig weights at various ages.

Class.	Average weights at—			
	3 months.	6 months.	9 months.	12 months.
	Pounds.	Pounds.	Pounds.	Pounds.
Breeders' pigs.....	41	122	194	267
Experimental pigs.....	48	140	^a 235
Breeders' standard.....	63	176	263	347

^a Weight at 8 months, when marketed.

Figure 11 shows the average of the weekly individual weights obtained from 121 hogs on the Bureau of Animal Industry Experimental Farm. It is seen from this curve that the fattening stock

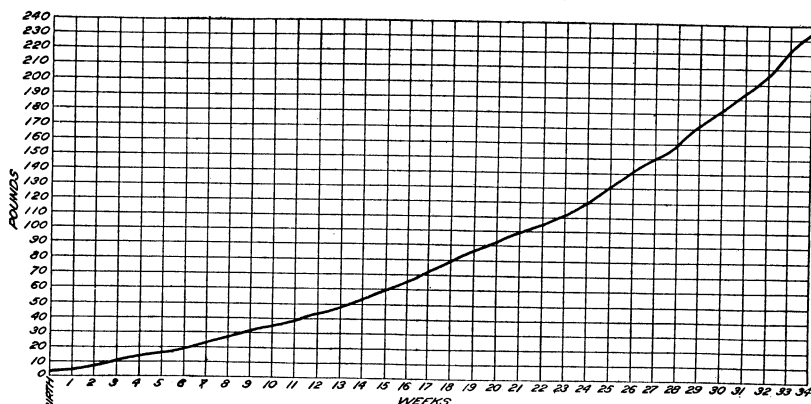


FIG. 11.—Average weekly weights of 121 hogs at Bureau of Animal Industry Experimental Farm, Beltsville, Md.

was disposed of at about 8 months of age, weighing between 200 and 250 pounds. At marketing the live weight approximated in pounds the age in days.

THE KEEPING OF RECORDS.

On a farm where swine are raised for purely market purposes and where the number of sows is small there need be no identification of the stock. The feeder knows his animals and even when mistakes are made they are of relatively small importance. But where large herds are maintained or where pure-bred stock is bred, there is necessity for some method of identifying the individuals. It enables the careful breeder to tell the ancestry of any member of the herd, which is a self-evident advantage in the selection of breeding stock. The clerical end of record keeping need not be discussed, but it is well to mention a few methods used to identify the animals. No practical method of branding hogs has been devised. Some breeders use ear tags marked with different numbers, but these tear out very easily and become lost. They are also subject to the objection that it is impossible to mark pigs by this method at birth. No system is free from defects, but one of the most satisfactory methods is to mark by means of ear cuts or notches, each of which represents a number and by combining them any number from 1 up can be designated. These notches can be cut at the time of birth, and unless the pig has an ear mutilated in fighting, they usually remain permanently. The following is a key to a simple and effective method of notching pigs so as to be able to record their breeding. All pigs in the same litter should have a common litter mark. Keep a record of the mark and the sow's identification, and her pigs can then be selected at any time.

A method of notching pigs.

Location of mark.	Number indicated.	
	Left ear.	Right ear.
Outer side, next to head.....	1	10
Outer side, midway between head and tip of ear.....	3	30
Outer side, next to tip of ear.....	5	50
Inner side, next to head.....	2	20
Inner side, midway between head and tip of ear.....	4	40
Inner side, next to tip of ear.....	6	60

The cuts may be made with a knife, but the most convenient instrument is a punch which nicks the pigs' ears quickly and makes a clean cut. Little trouble will be experienced in having the edges of the cuts heal together, but if they should it is an easy matter to see them on close inspection and to cut them open again. By this method it is possible to number consecutively from 1 to over 100 with not more than two notches in either ear.

SANITATION IN THE HOG LOT.

The greatest drawbacks to the hog industry that breeders in this country have to contend with are the losses through hog cholera, tuberculosis, and the infestation of the animals, especially young pigs, by parasites. Were it not for the fecundity of swine their profitable production in the presence of these serious diseases would be out of the question. In the following remarks on sanitation no attempt is made to go into the details of the diseases affecting hogs or their treatment. The object is merely to call attention to the simple measures which may be used by any farmer to avoid, to a large extent, the decimation of his herd by epizootics. Cleanliness and rational methods of management are relied upon by thousands of farmers to keep their herds in health and vigor. They are the marks of the good farmer and successful hog breeder.

Hog cholera and swine plague, both highly fatal diseases characterized by fever and heavy mortality, are so very similar that the breeder may regard them as identical so far as his practical management of the herd is concerned. Positive differentiation between the two diseases can only be made by the most careful bacteriological tests, and by employing the assistance offered by a fully equipped laboratory. However, sanitary preventive methods which are found beneficial with one of these diseases will prove equally efficacious with the other.

There are a few fundamental facts which the breeder must remember if he is to avoid losses through hog cholera or swine plague. The first is that they are specific diseases caused by germs, and the contagion can not be spread from one animal to another or from one herd to another except through the agency of these minute organisms.

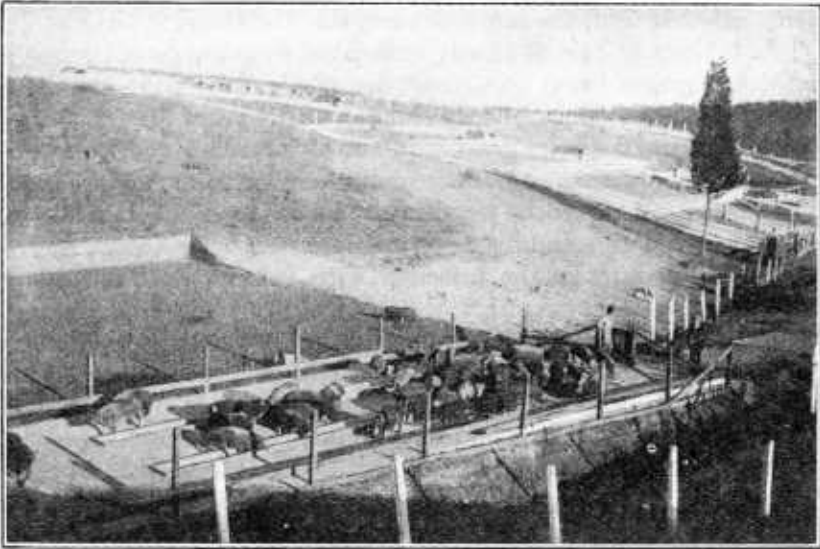


FIG. 12.—Sanitary hog pens and feed lots are essential to successful hog raising. (Photograph by courtesy of District of Columbia Workhouse Farm, Occoquan, Va.)

They may be carried in a multitude of ways—by the hogs themselves, on the clothing of persons, on vehicles, in feed, by birds, dogs, and other animals, or by streams. The breeding or feed of a hog can not cause either disease, although bad methods may so weaken the constitution and vitality that the animal becomes more susceptible to them than would otherwise be the case. Since these diseases can only arise from the presence of their specific causative agents, it can readily be seen that dentition and the presence of supernumerary teeth or black tusks can not, as has been suggested by many, play any part in their development. A second fact to be borne in mind is that diseases caused by germs may be best prevented or controlled by thorough disinfection and scrupulous cleanliness.

Tuberculosis is prevalent among hogs in the United States, and every owner of swine should be on his guard against the introduction of this serious malady upon his premises. Unlike hog cholera this disease is insidious in its attack and slow in its development, so that it may be present for months in a herd without exciting the least suspicion of the owner, and will be revealed to him only at the time of slaughter. Until recent years tuberculosis has been looked upon as of uncommon occurrence and only of importance from a meat-inspection standpoint; but to-day it must be recognized as a serious menace to the owner of hogs, and especially to the one who allows his hogs to run with cattle that have not been proved to be free of tuberculosis, or who feeds them upon infected products as part

of their ration. As tuberculosis of hogs is chiefly contracted through eating infected feed, the importance of this statement is obvious.

Tuberculosis of hogs is closely associated with the same disease in cattle, the reason being apparent when one considers the close relations of these two species of animals upon nearly every farm.¹ Tuberculous cattle may scatter great numbers of tubercle bacilli with their excrement; cows that are tuberculous may produce contaminated milk that is subsequently fed to pigs; and carcasses of cattle that have died from tuberculosis are sometimes eaten by hogs. Any of these conditions make the infection with tuberculosis of the hogs concerned a very easy matter.

The feeding of hogs upon creamery refuse is also a very frequent source of infection. In this way the milk of a single cow with a tuberculous udder, if sent to a public creamery, may spread the disease to a number of hogs, and may also infect many farms that have never previously been contaminated with tuberculosis.

An equally dangerous source of infection is likewise observed in the methods which obtain among some of the small country slaughterhouses. It is not unusual for these houses to get rid of their blood, intestines, viscera, and other inedible parts by feeding them to hogs, a herd of which is usually kept on the premises. This custom is pregnant with danger and serves to perpetuate the infectious principle of various contagious and parasitic diseases, particularly tuberculosis.

Hogs are also susceptible to tuberculous infection from affected persons and poultry, but these sources are undoubtedly of far less moment to the hog owner than those existing in a herd of tuberculous cattle.

Intestinal worms, lung worms, and skin parasites also levy a burdensome tax upon the profits of hog raising. Absolute cleanliness will be found valuable in preventing and controlling these parasitic troubles, as well as the more serious diseases—hog cholera and tuberculosis.

PREVENTION OF DISEASE.

In dealing with the diseases of hogs, preventive measures must be most relied upon. The animals must be given dry and well-ventilated quarters, which must be kept clean. Contrary to common belief, hogs have some habits which raise them above other domestic animals from the standpoint of cleanliness. For example, unless compelled to do so, a hog will not sleep in its own filth. If a part of the floor of the pen is raised and kept well bedded with straw, while the rest is not, all excrement will be left on the unbedded portion of the floor and the bed itself will be always clean.

¹ See Farmers' Bulletin 781, "Tuberculosis of Hogs."

In addition to cleanliness close attention should be given to the feed, so that nothing may be fed that will convey the germs of disease, especially tuberculosis, to the herd. If the hogs are fed milk in any form obtained from cows kept upon the same farm, the cows should be subjected to the tuberculin test. If they run with the dairy cattle of the farm a tuberculin test of all the cattle is none the less desirable. Animals dead from any disease should not be fed to the hogs until the meat has been made safe by cooking. Skim milk or refuse from a public creamery should not be fed to hogs until it has been thoroughly sterilized.

Feeding and drinking places should be clean and the water supply pure. Unless the origin is known to be uncontaminated and there has been no possibility of infection during its course, hogs should not be allowed access to any stream. Wallows should be drained out and kept filled up as much as possible. At least once a month the quarters should be disinfected with air-slaked lime or a 5 per cent solution of crude carbolic acid. These precautions will be found valuable aids in the destruction of the various animal parasites, as well as a protection from some more serious troubles.

DANGER IN INBREEDING AND IN STRAIGHT CORN DIET.

While inbreeding is the surest and quickest means to fix type, it should be resorted to with the greatest care. The value of the system is that it enables the breeder to intensify desirable character-

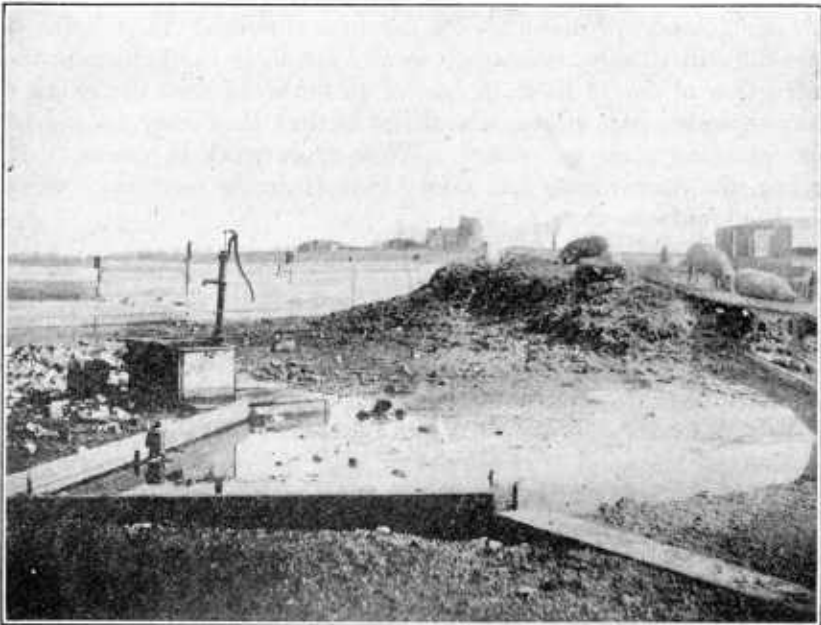


FIG. 13.—Insanitary hog quarters harbor disease germs. (Photograph by courtesy of the Philadelphia Bureau of Health.)

istics in a herd and makes improvement possible in a shorter time than where selection alone is used. It stands to reason that if desirable characteristics can be intensified, the same will be true of undesirable ones. Much of the disaster which seems to have followed inbreeding has probably been due to the fact that this point was overlooked or given only slight importance, and thus loss of vitality and constitution and susceptibility to disease have followed. Therefore if the young breeder contemplates inbreeding, he should avoid matings that tend to unite similar defects. Not only should care be taken to prevent this in the animals mated, but there should be no chance of bad effects due to the inheritance of undesirable characteristics from parents and other ancestors. Some of the greatest work ever done in hog breeding has been based on these principles.

The straight corn diet, which many hogs receive from one year's end to the other also lessens vitality, and the researches of the Wisconsin Experiment Station have shown that this is probably brought about by retarding the development of the vital organs. A minimum of inbreeding and a varied diet, including, especially for breeding stock, ample range, will therefore better enable the herd to resist the attacks of disease.

ADVANTAGE OF ISOLATED HOG HOUSES.

The advantage of a number of small portable houses, each accommodating a few hogs, rather than one large piggery for the entire herd has been referred to previously. In districts where cholera is prevalent these are undoubtedly the best shelters. They make it more difficult to carry contagion to all animals in the herd, and the destruction of one of them in case of an outbreak does not entail a great expense. An added advantage is that they may be moved from place to place as needed. While more work is necessary in feeding, the convenience and safety from their use more than offset this disadvantage.

QUARANTINE RESTRICTIONS.

Whenever any animals are brought to the farm, or when animals are brought home from shows or from neighboring farms, they should be kept apart from the rest of the herd for at least three weeks. If they have been exposed to hog cholera or swine plague the diseases will be manifested within this time, and the sick animals can be treated or killed and disposed of at once.

If cholera breaks out in the neighborhood the farmer should maintain a strict quarantine against the infected herds. He should refrain from visits to farms where they are located, and should insist on requiring that his neighbors stay out of his hog lots. Dogs, cats, crows, and buzzards may carry the infection from farm to farm and should be guarded against as far as possible.

TREATMENT OF DISEASES.

As soon as sickness appears in the herd the unaffected hogs should at once be removed to clean, disinfected quarters, preferably without much range, for by running over pastures they may come in contact with contagion. Their feed should be carefully regulated and, if they have previously been on pasture, should include some green feed, roots, or an abundance of skim milk.

The quarters in which the sickness first appeared should be thoroughly cleaned, all bedding and rubbish burned, and loose boards and old partitions torn out and burned. If the pen is old, knock it to pieces and burn it. Disinfect pens and sleeping places, using air-slaked lime on the floors and the carbolic-acid solution on the walls and ceilings. Whitewash everything. If a hog dies from any cause the carcass should never be exposed where it may be devoured by the other hogs or by passing birds or beasts, but should be burned at once or buried deeply and the pens thoroughly disinfected immediately. If possible, do not move the carcass from the place where it falls; but if necessary to do so the ground over which it is dragged should be disinfected. It is not known positively how long the virus of hog cholera may survive in the soil, but under favorable conditions it is not unlikely that it may live in the ground for several months. Care should be taken to maintain a strict quarantine between the sick and healthy hogs. The same attendant should not care for both lots unless he disinfects himself thoroughly after each visit to the infected hogs. Dogs should be confined until the disease is stamped out.

The treatment of hogs suffering from cholera is not satisfactory after the disease has become well established in a herd. The prevention of an outbreak by the use of anti-hog-cholera vaccination should be relied upon rather than the cure of sick animals.¹

DESTRUCTION OF VERMIN.

LICE.

The destruction of vermin is of importance in the production of swine. Practically all swine are infested to a certain degree with the common hog louse (*Hæmatopinus suis*), and unless the animals are freed from this pest it is apt to retard their growth. Although lice may not be the direct cause of death, still their presence lowers the vitality of the hog and predisposes him to attack from infectious diseases. One of the first requisites in preventing an outbreak of cholera is to put the hogs in as perfect a physical condition as possible, and it is also obvious that the animals should be in perfect health in order to fatten rapidly and economically.

¹ See Farmers' Bulletin 834, "Hog Cholera: Prevention and Treatment."

Lice are common pests among swine, and vigorous and persistent treatment is required to eradicate them. The farmer should frequently examine his hogs about the ears, flanks, and insides of the legs to see if they are lousy. The lice may be readily seen traveling among the bristles, particularly in the parts just mentioned. The eggs, or "nits," are small white oval bodies attached to the bristles. Dipping does not as a rule destroy the vitality of these eggs. Swine should be dipped repeatedly in order to kill the lice that hatch out of the eggs after the previous dipping. These lice are blood-sucking parasites, and by biting the hog and sucking blood they cause a great deal of skin irritation. Furthermore, they act as a drain on the vitality of the hog, through the loss of blood which they abstract.

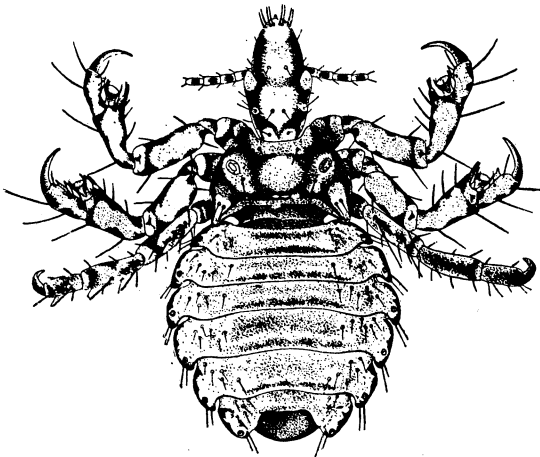


FIG. 14.—Male hog louse (*Hematopinus suis*). Enlarged.

When lousy the hog is usually restless and rubs on posts and other convenient objects. The coat looks rough and harsh. This pest is transmitted from one animal to another by direct contact, or by contact with infected bedding or quarters.

MANGE.

Mange, one of the most common of skin diseases, is caused by a mite which feeds on the skin. It is much more common and severe on young stock than on the older animals, although the mature animals as well as the young are likely to become affected if the disease is introduced into the herd. Mange is characterized by the formation of crusty scabs on the face and neck and along the back, and in severe cases the mite may be found on any part of the body. The hair is stiff and erect, giving the pig a very unthrifty appearance.

All newly purchased stock should be examined for lice and other skin diseases, and if any are found the hog should be treated before he is turned with the rest of the herd.

DIPPING TO DESTROY VERMIN.

To free hogs from vermin they should be dipped two or more times at intervals of about two weeks, preferably 15 to 16 days for lice. Several dippings may be required before complete eradication is

accomplished. Do not fail at the same time to clean and disinfect thoroughly the sleeping quarters. Cresol compound (U. S. P.) may be used for dipping and disinfecting. For dipping, mix in the proportion of 1 gallon to 100 gallons of water; for disinfecting, in the proportion of 3 gallons to 100 gallons of water. Coal-tar stock dips and nicotin stock dips may also be used to treat hogs for lice. For use they are diluted with water in accordance with directions supplied by the manufacturers. Cresol compound, coal-tar dips, and nicotin dips may be purchased at the drug store.

For mange crude petroleum is more effective than the ordinary stock dips. It is also destructive to lice. The vat may be filled with the oil or half filled with water before the oil is added. If one dipping does not effect a cure the treatment should be repeated in one or two weeks.

Owing to the great variation in the composition of crude petroleum from different localities and the greater injurious effects of some crude oils than of others, crude petroleum, if of a kind not used before, should be tested on a few animals before extensive treatment is undertaken. Animals treated with crude petroleum should be provided with plenty of shade and water. They should not be dipped in oil in very cold or very warm weather. One of the best varieties of oil for use on live stock is Beaumont crude petroleum, and oils of similar composition are more likely to be satisfactory than those which vary widely from it. The specifications are as follows: Specific gravity ranging from $22\frac{1}{2}^{\circ}$ to $24\frac{1}{2}^{\circ}$ Baumé; 40 per cent of the bulk boiling between 200° and 300° C.; $1\frac{1}{4}$ to $1\frac{1}{2}$ per cent of sulphur.

Another remedy for mange is lime-sulphur solution. This remedy is not highly effective in destroying lice. It must be used warm (100° F.), and the hogs should be dipped twice with an interval between dippings of 7 to 10 days. Lime-sulphur dip may be purchased in concentrated form, or it may be prepared at home as follows: Slake 10 pounds of quicklime with sufficient water to make a thin paste, and stir in 24 pounds of fine sulphur (flowers or flour). Boil this mixture for two hours in 25 or 30 gallons of water. Allow the sediment to settle in a tub or barrel. Draw off the liquid into the vat (carefully avoid disturbing the sediment), and add sufficient warm water to make 100 gallons. The dipping solution in the vat may be maintained at the proper temperature by steam brought by pipe or hose from a boiler.

Dipping vats are made of various materials, but the most durable is cement.¹ The vat should be set in the ground at a convenient place where there is good surface drainage away from the vat. A suitable size for a vat in which to dip hogs is 10 feet long at the top, 8 feet long at the bottom, 1 foot wide at the bottom, and 2 feet wide at

¹ See Farmers' Bulletin 481, "Concrete Construction on the Live Stock Farm."

the top. It should be deep enough so that the hogs will be completely immersed in the dip and will not strike the bottom of the vat when they plunge. If possible, the vat should be located so that a 2-inch drain pipe may lead from the bottom of the vat to facilitate emptying and cleaning, otherwise it is necessary to pump or dip out the contents of the vat in order to clean it. Do not use old, filthy dip, but clean and recharge the vat before dipping again if the dip has become very dirty or if it has stood a long time in the vat. The end where the hogs enter should be perpendicular and the entrance should be on a slide. The other end should slope gradually, with cleats to provide footholds for the hogs for emerging after dipping. A dipping vat is very useful wherever a large number of hogs are kept.

HOG WALLOWS.

Some farmers favor hog wallows; others are strongly opposed to them. Filthy hog wallows are a source of danger. Hogs wallowing in or drinking contaminated water are likely to contract disease. However, there are many advantages to be derived from wallows. A cool bath is very soothing to a hog during the hot weather. It cleans the scurf from the skin and protects the hogs from flies. Crude petroleum, sufficient to form a thin layer on top of the water, may be poured into the wallow about every 10 days. This will tend to keep the hogs free from lice and other skin parasites. If the skin becomes irritated from the oil, its use should be discontinued. Small quantities of coal-tar dip are sometimes added to the water in hog wallows, but there is an element of danger in this practice, as poisoning may result from the absorption of phenols by hogs which lie in the wallow more or less continuously.

On some of the larger hog farms concrete wallows are becoming popular. The cement hog wallow should be located in a shady place and made so as to contain from 8 to 10 inches of water. A 2-inch drain pipe, as recommended for the dipping vat, should be placed in the bottom of the wallow to permit its being cleaned out.

SPRAYING AND RUBBING.

In many cases a farmer is not financially able to build a hog wallow or a dipping vat. If this be the case, the dip, properly diluted according to directions, can be applied with a spray pump or sprinkling can, or else rubbed on every part of the body by means of a brush or a swab of cotton waste. Care should be taken not to apply the dip stronger than directed.

Another method of controlling lice is to tie gunny sacks or similar coarse cloths around a post at a proper height, so that the hogs may rub against them, and saturate the sacks frequently with crude petroleum.

INTESTINAL WORMS.

Intestinal worms are common in hogs and are particularly injurious to growing pigs. Insufficiently fed, neglected pigs living in dirty pens and yards, fed from filthy troughs, drinking contaminated water, bathing in old hog wallows, and rooting and sleeping in manure piles and stack bottoms soon become infested with worms. Such pigs do not thrive, but develop into pot-bellied, profitless runts. Pens should be kept clean and dry and the manure frequently removed.

Mixtures containing charcoal, copperas, etc., such as that described on page 14, are believed by some to be of value as preventives and destroyers of worms, but their usefulness probably depends upon their general effect on the condition of the pig and not upon their action on the worms. Other things being equal, a pig in good condition is better able to resist the attacks of worms than one that is not in good condition. Mineral mixtures may, therefore, by helping to balance the ration, tend to increase the powers of resistance to the ill effects of worms and other parasites. They should, however, be classed as tonics or conditioners rather than as worm preventives or destroyers.

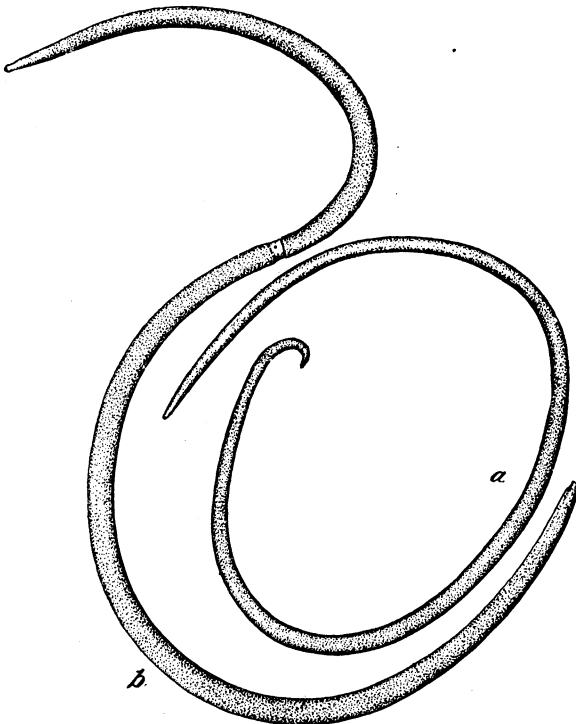


FIG. 15.—The common roundworms of swine (*Ascaris suum*) a, Male; b, female.

The following treatment has been found to be very effective in expelling intestinal worms in experiments conducted by the Zoological Division of the Bureau of Animal Industry:

Withhold all feed and water for 24 hours, then give each pig from 1 to 2 ounces of castor oil to which has been added oil of American wormseed as follows: Pigs weighing less than 50 pounds, one-half teaspoonful; pigs weighing 50 to 100 pounds, one teaspoonful; large hogs, 2 teaspoonfuls. Each pig should be dosed separately if the best results are to be obtained. Castor oil should always be given with oil of American wormseed. Other laxatives are not satisfactory.

DANGEROUS TO DRENCH HOGS.

Drenching hogs is dangerous, as they are liable to get the remedy into the lungs. With sufficient assistance pigs may be held, the mouth kept open by means of a couple of loops of wire or rope, or leather straps, and the medicine given in a tablespoon or a large kitchen spoon. By this method, though it is troublesome, one may be certain that each pig gets his proper dose. After dosing with the above mixture pigs may be fed and watered. Repeat the treatment in 10 days.

CHANGE PASTURES FREQUENTLY.

Healthy hogs become infected with intestinal worms from feed, water, and soil which have been infested by the droppings from infected hogs. Frequent change of pasture is one of the best means of reducing worm infestation to a minimum. Hogs, however, should not be allowed to run at large on open range, as this favors the spread of hog cholera.

Swine can be raised when they are confined in limited quarters if the quarters are kept clean, but they will do much better and stay in better health if they have plenty of pasture. Divide the pasture into convenient areas, so that the hogs can be shifted from one pasture to another. This not only provides fresh pasture, but affords an opportunity to disinfect the pastures by plowing and reseeded or by exposure to the sun and weather.

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